	Units	Symbol			
Gas Constant		R	8314	8314	8314
Gas Mol Wt (air)		M	28.97	28.97	28.97
Specific gas constant			286.99	286.99	286.99
Heat cap ratio (air)		Hc	1.4	1.4	1.4
Pipe Area	m2	A1	26.88	26.88	26.88
Orifice Area	m2	A2	6.72	6.72	6.72
Pressure in pipe (up)	Pa	P1	112,000	190,566	200,000
Ambient pressure (down)	Pa	P2	101,000	101,000	101,000
Air temp	K	T	298	298	298
Air density	Kg/m2	p	1.31	2.23	2.34
Speed of sound	m/s		346.02	346.02	346.02
Coeff of disharge		Cd	0.80	0.80	0.80
Hole dia/Pipe dia beta		Bt	0.25	0.25	0.25
Meter coeff		C	0.80	0.80	0.80
Compressibility factor, ideal gas		Z	1.00	1.00	1.00
Incompressible					
Vol flow	m3/s	Q	698.15	1,527.26	1,567.35
Mass flow	kg/s	M.	914.30	3,403.14	3,665.37
Velocity from Vol flow	m/s	V2	103.89	227.27	233.24
Velocity from mass flow	m/s		103.89	227.27	233.24
Compressible wiki orifice flow					
Formula part k/k-1 etc			0.087880703	0.23442555	0.23387226
Mass flow formula 5			864.87	2,403.44	2,519.44
Mass flow formula 6			864.87	2,403.44	2,519.44
Vol flow formula 8			660.4041706	1078.61266	1077.33906
Velocity from Vol flow	m/s	V2	98.27	160.51	160.32
Velocity from mass flow	m/s		98.27	160.51	160.32
AFT					
(k-1)/k			0.29	0.29	0.29
pup/pdown bit			2.03	2.20	2.22
Mass flow			1,300.36	1,353.37	1,358.49
Freestudy					
Crit pressure ratio			0.53		

Wiki orifice compressible flow

meter coefficient C which is defined as $C = \frac{C_d}{\sqrt{1-\beta^4}}$ t

$$Q = C\ A_2\ \sqrt{2\ (P_1 - P_2)/\rho}$$

$$\dot{m} = \rho\ Q = C\ A_2\ \sqrt{2\ \rho\ (P_1 - P_2)}$$

Wiki orifice flow incompressible

$$(5) \qquad \dot{m} = C\ A_2\ \sqrt{2\ \rho_1\ P_1 \left(\frac{k}{k-1}\right)\left[(P_2/P_1)^{2/k} - (P_2/P_1)^{(k+1)/k}\right]}$$

Formula part to simplify

$$\left(\frac{k}{k-1}\right)\left[(P_2/P_1)^{2/k} - (P_2/P_1)^{(k+1)/k}\right]$$

$$(6) \qquad \dot{m} = C\ A_2\ P_1\ \sqrt{\frac{2\ M}{Z\ R\ T_1}\left(\frac{k}{k-1}\right)\left[(P_2/P_1)^{2/k} - (P_2/P_1)^{(k+1)/k}\right]}$$

$$(8) \qquad Q_1 = C\ A_2\ \sqrt{2\ \frac{Z\ R\ T_1}{M}\left(\frac{k}{k-1}\right)\left[(P_2/P_1)^{2/k} - (P_2/P_1)^{(k+1)/k}\right]}$$

Utexas orifce flow compressible

$$w = C\,P_1 A_2 \sqrt{\frac{2g_c M}{RT_1}\left(\frac{\gamma}{\gamma-1}\right)\left[\left(\frac{P_2}{P_1}\right)^{2/\gamma} - \left(\frac{P_2}{P_1}\right)^{(\gamma+1)/\gamma}\right]} \qquad (9)$$

AFT choked flow through orifice What is value of R

$$\dot{m} = C_d A P_{down} \sqrt{\frac{2}{RT}\left(\frac{\gamma}{\gamma-1}\right)\left(\frac{P_{up}}{P_{down}}\right)^{\frac{\gamma-1}{\gamma}}\left(1+\left(\frac{P_{down}}{P_{up}}\right)^{\frac{\gamma-1}{\gamma}}\right)}$$

Freestudy

$$m = C_d A_2 \sqrt{\left[\frac{2\gamma}{\gamma-1}\right]\left\{[p_1\rho_1]\left[\left(\frac{p_2}{p_1}\right)^{\frac{2}{\gamma}} - \left(\frac{p_2}{p_1}\right)^{1+\frac{1}{\gamma}}\right]\right\}}$$

critical pressure ratio is :

$$r = \left(\frac{2}{\gamma+1}\right)^{\frac{\gamma}{\gamma-1}}$$